WHAT IS CLAIMED IS:

1. A catheter for removing material from a body lumen, said catheter comprising:

a catheter body having a proximal end, a distal end, and an aperture;

a non-rotating cutting blade having a cutting edge configured to move across the aperture between a capture position and a closed position which substantially closes said aperture; and

an imaging device coupled to said cutting blade, wherein said imaging device is in an imaging position when the blade is in the closed position and wherein the imaging position is aligned with the location of the cutting edge when the blade is in the capture configuration.

2. A catheter as in claim 1 wherein said imaging device comprises an ultrasound transducer array.

3. A catheter as in claim 1 wherein said imaging device comprises at least one optical fiber.

4. A catheter as in claim 1 wherein said imaging device comprises an optical coherence tomography device.

5. A catheter as in claim 1 wherein said cutting blade is mounted on said catheter body to extend outwardly from said aperture on the catheter body, and wherein said cutting blade in said capture position is configured to leave a gap between said cutting blade and said catheter body to define a cutting window in which material may intrude to be engaged.

6. A catheter as in claim 5 wherein said imaging device is located on a distal end of the cutting blade, said device capable of imaging material on the body lumen when said cutting blade is in said capture position.

7. A catheter as in claim 5 wherein aperture on said catheter body comprises a forward facing opening, said cutting blade mounted to extend linearly outward from said forward-facing opening.

8. A catheter as in claim 5 wherein said imaging device remains outside the catheter body when the blade is in the first open position and the second closed position.

9. A catheter as in claim 1 wherein said cutting blade includes means for defining said cutter window.

10. A catheter as in claim 1 wherein said material imaging device comprises a hemispherical transducer mounted to provide a 360° image.

11. A catheter as in claim 1 wherein said cutting blade includes at least one penetrating point.

12. A catheter as in claim 1 wherein said cutting blade comprises a first aperture adapted to remove material that enters therein and a second aperture for exposing said imaging device, wherein said cutting blade in a first position aligns said first aperture with the aperture on the catheter body, and said cutting blade in a second position aligns said second aperture with the cutter window.

13. A catheter for removing material from a body lumen, said catheter comprising:

a catheter body having a proximal end, a distal end, and a cutter window;

a cutting blade mounted on said catheter body and configured to move between a first open position and a second closed position which substantially closes said cutter window; and

an imaging device mounted to extend outward from a forward facing distal opening on said catheter body.

14. A catheter as in claim 13 further comprising a second material imaging device on said cutting blade.

15. A catheter as in claim 13 further comprising a second material imaging device on said catheter body, opposite said cutter window.

16. A method for removing material from a body lumen, the method comprising:

positioning a catheter having a cutting blade with an imaging device adjacent to said material in the body lumen, said cutting blade mounted on said catheter body to excise material which enters an aperture defined at least in part by the catheter body;

imaging said material on the body lumen with said material imaging device when said cutting blade substantially closes said aperture;

opening said cutter window by moving said cutting blade to a first open position; and

excising material by moving said cutting blade to a second closed position.

17. A method as in claim 16 wherein said imaging of material and excising without repositioning of said catheter.

18. A method as in claim 16 further comprising imaging of a target area on the body lumen after said material has been excised, said imaging occurring without repositioning said catheter.

19. A kit comprising:

a catheter having a material imaging device mounted on a cutting blade wherein said imaging device is in an imaging position when said cutting blade closes a cutting window on the catheter;

instructions for use in removing material from a body lumen comprising imaging said body lumen when said cutting window is closed; and

a package adapted to contain the device and the instructions for use.

20. A catheter for removing material from a body lumen, said catheter comprising:

a catheter body having a proximal end, a distal end, and an aperture;

a slidable, telescoping portion on said catheter body configured to extend outwardly from said aperture on the catheter body, said telescoping portion having a first open position leaving a gap between one edge of said portion and said catheter body to define a cutter window in which material may intrude to be engaged and having a second closed position wherein said cutting blade is positioned to cut off said material.